DOCUMENT RESUME

ED 025 639 VT 007 419

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Cost Analysis of Selected Educational Programs in the Area Schools of Iowa.

Iowa State Univ. of Science and Technology, Ames.
Spons Agency- Iowa State Dept. of Public Instruction, Des Moines. Div. of Vocational Education.
Pub Date 68
Note- 23p.
EDRS Price MF-$0.25 HC-$1.25
Descriptors- Area Vocational Schools, Community Colleges, Comparative Analysis, Educational Finance, *Expenditure Per Student, *General Education, *Post Secondary Education, *Program Costs, Technical Education, *Vocational Education
Identifiers- *Iowa

To determine relationships between the current-unit-cost-per-student contact hours for post-secondary arts and science transfer curricula and selected vocational-technical programs, the 15 area schools of Iowa were visited personally by the investigator and data collected from the financial records of the institutions. The cost of each specialized vocational-technical curriculum was compared to the mean cost of educating a student in the arts and science transfer curricula. Some major conclusions resulting from analysis of the 1967-68 data were (1) Enrollment had the greatest degree of inverse relationship with student cost. (2) Administrative and plant operation expense were contributing factors to differences between schools in student costs. (3) Instructional expense was related to enrollment and student costs. (4) Rental of buildings on some campuses increased costs. (5) The vocational-technical programs were more expensive than were the arts and science transfer curricula, and (6) Adequate financing is necessary for junior colleges considering vocational-technical programs. (DM)

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# COST ANALYSIS OF SELECTED EDUCATIONAL PROGRAMS IN THE AREA SCHOOLS OF IOWA.

by

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Conducted under a research grant from
Vocational Education Branch
(VEA - 1963 - 4(a) Ancillary Funds)
Iowa Department of Public Instruction, Des Moines.

IOWA STATE UNIVERSITY
of Science and Technology
Ames, Iowa

1968

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# COST ANALYSIS OF SELECTED EDUCATIONAL PROGRAMS IN THE AREA SCHOOLS OF IOWA

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## PURPOSE OF THE STUDY

One of the most crucial problems facing this nation is how to provide adequate financial support for the increasing enrollments in higher education. Because of the emerging nature of public junior colleges with their trend toward comprehensive programs, the financial problem becomes more acute. With the tremendous number of different programs and curricula being offered, this creates a variation in unit costs, resulting in differences in cost for the various educational curricula.

In order to ascertain what cost differential exists among programs, the relationship between the current-unit-cost-per-student-contact hours for arts and science transfer curricula and selected vocational-technical programs was determined. A cost analysis ascertained the unit cost for each vocational-technical program and this cost was compared to the mean cost of educating a student in the arts and science transfer curricula to see if there was a consistent relationship across the institutions included in this study. In addition, an analysis of each factor that contributed to this cost was made to determine any relationship that might exist.

A secondary purpose of the study was to ascertain the sources and the amounts of funds received by each institution. The general categories of federal, state, local, and student fees were used to see what relationship existed in the amount received by each area school.

The rationale underlying this study was expressed in the following basic assumption; Current-unit cost-per-student-contact hours for particular curricula are dependent upon the factors of enrollment, administrative costs, operation and maintenance of plant, instructional supplies, auxiliary services, fixed charges, and other indirect expenses. This assumption generated the following questions:

(1) To what extent is the factor of enrollment involved in the compilation of current unit costs?
(2) How much does the factor of administrative costs in an area school contribute to the current unit cost for a particular program?
(3) How much does the factor of instructional costs in an area

school contribute to the current unit cost for a particular program?

(4) Are the expenses incurred in the operation and maintenance of plant a significant factor in determining the current unit cost for a particular program?

(5) How much contribution do the factors of auxiliary services, fixed charges, and indirect expenses make toward the current unit cost of a particular program in an area school?

All of these factors are important to an institution so that it may provide the best courses and curricula for the most feasible number of students. New curricula, which lead toward employment in developing occupations, may have to be established and operated at a high unit cost for a few years until enrollments rise to provide a more economical unit cost. Knowledge about the cost of each curriculum is necessary for the development of a rational program for an institution. Even more important is the contribution this knowledge can make toward development of a state policy to insure provision of all essential curricula. It can also be used as a basis for consideration of a different public policy supported by a fiscal policy that is congruent with the purposes of the comprehensive junior college.

## Delimitations of the Study

The scope of this investigation was confined to a study of the unit costs of selected educational programs in the area schools of Iowa for 1967-68. This study included the arts and science transfer curricula and the following selected vocational-technical programs: 1) auto body repair, 2) auto mechanics, 3) clerical office, 4) data processing, 5) dental assistant, 6) electronics technology, 7) mechanical drafting, 8) mechanical technology, 9) medical assistant education, 10) practical nursing, 11) radio-television service, 12) refrigeration, heating, and air-conditioning service, 13) secretarial training, and 14) welding.

Those expenditures incurred for instructional costs, administrative costs, operation and maintenance of plant, auxiliary services, fixed charges, and other indirect expenses were used for the computation of the current-student-contact-hour-unit-cost. Initial expenditures for capital outlay and equipment were not used.

## Key Terms and Definitions

In order to clarify the meanings of various terms used in this study, the following definitions were made:

1) Comprehensive community colleges: a post-high school publicly supported institution which offers two years of arts and sciences, preprofessional, or other instruction partially fulfilling the requirements for a baccalaureate degree but which does not confer any baccalaureate degree and which offers in

whole or in part the curriculum of a vocational school.

2) Merged areas: an area where two or more county school systems or parts thereof merge resources to establish and operate a vocational school or a community college in the state.
3) Area vocational schools: a post-high school publicly supported institution which offers as its curriculum vocational or technical education, training, or retraining available to persons who have completed or left high school and are preparing to enter the labor market; persons who are attending high school who will benefit from such education or training but who do not have the necessary facilities available in the local high school; persons who have entered the labor market but are in need of upgrading or learning skills; and persons who due to academic, socio-economic, or other handicaps are prevented from succeeding in regular vocational or technical education programs.
4) Current unit costs: the total expense incurred by an institution in the present fiscal year for any particular course or program, exclusing initial capital outlay and equipment.
5) Student contact hours: each required meeting time for each course offered. This includes laboratory sessions as well as regualr class periods.
6) Full-time equivalent enrollments: the sum of the total number of full-time students and the quotient of the sum of all contact hours attended by all part-time students divided by twelve.

## Funding

A research proposal, stating the objectives of the study, method of procedure, review of literature, and budget required to defray the cost of the study was submitted to the Research Coordinating Unit, Vocational Education Branch, Iowa State Department of Public Instruction in 1967. The State Research Committee reviewed the proposal and recommended that it be approved for funding. The proposal was approved by the Associate Superintendent of the Vocational Education Branch, State Departement of Public Instruction and funds were made available to conduct the study.

## METHOD OF PROCEDURE

To determine the cost of educating a student in a specified curriculum prompts the calculation of a current unit-cost-per-student-contact-hour for each curriculum. The computation of this unit cost was accomplished through the following steps:

1) Contacts with each area school in Iowa to gain permission to conduct the study.
2) Visits to each institution to gather the following data:
    a. Name, position, and salary of each professional staff member.
    b. A class schedule for each quarter for the 1967-1968 school year. This schedule was to be supplemented as

necessary to provide the name and number of each section of each course taught, credit and contact hours for each course, enrollment, and name of instructor.

c. A college catalog which contained a description of each course and curriculum offered.

d. A copy of the financial report of the fiscal period covered with all expenditures for current operation allocated to academic departments insofar as records were available.

e. The number of full-time equivalent students enrolled in each curriculum for the period covered.

3) Analysis of the data to determine:

a. Direct-salary-cost-per-student-contact-hour for each course.

b. Supportive-teaching-cost-per-student-contact-hour for each course.

c. Total-cost-per-student-contact-hour for each course.

d. Total cost of educating a student in each curricula offered.

e. The average cost of educating a student in the arts and science transfer curricula.

f. The average cost of educating a student in each of the selected vocational-technical curricula.

4) Calculation of the ratio of the unit costs for the various types of specialized vocational-technical curricula in each of the fifteen merged areas.

5) Calculation of the average ratio of vocational-technical curricula costs to the cost of general curricula for all institutions.

Because of the recent establishment of many of the programs in the institutions, the initial investment for buildings, sites, and equipment has been great. To include these expenditures as current costs for a particular fiscal year would not show the true cost picture for that year. Thus, the equipment and increase in plant expenditures have not been considered in determining current instructional costs, since such expenditures enhance the valuation of the schools investment and are not properly chargeable against the fiscal year's operations. No depreciation in the value of buildings or equipment was included in costs, but repairs and replacements were included.

The first part contained information relative to each vocational-technical program that was considered in the study. The title of the program was given, the enrollment for the first and second year level during the current fiscal year, and the expenses incurred directly by the program. These expenses were classified into five general areas which included: 1) instructional services, 2) fixed charges, 3) equipment maintenance and repair, 4) minor equipment and remodeling, and 5) other operational expenses. The names of the vocational-technical instructors were given, as well as the mathematical formula for computing the prorated vocational-technical supervision expenses applicable to this program.

The data collected on the second part of the schedule pertained to administrative and supervision expenditures for the current fiscal year, 1967-1968, which could be prorated between the vocational-technical programs and the arts and science curriculum. These expenditures were classified into the following general areas:

1) Expenses incurred by the salaries of administrators, guidence directors, counselors, and librarians.
2) Expenses incurred by the board of directors.
3) Expenses incurred by the superintendent's office.
4) Expenses incurred by the operation of the local campus.
5) Expenses incurred by fixed charges, which included insurance, local board's contribution to FICA and IPERS, rent, and taxes.
6) Expenses incurred by the maintenance of the local campus.
7) Expenses incurred by contracted services for the institution.
8) Expenses incurred by the repair and restoration of equipment and facilities.
9) Expenses incurred by the replacement of equipment.
10) Expenses incurred by debt service.
11) Expenses incurred by the salaries of arts and science instructors.

The final item of data collected on this part of the instrument was the total full-time equivalent enrollments for the arts and science curriculum and the vocational-technical programs.

The third part of the schedule contained information relative to each instructor in the arts and science curriculum. This information was his name, the title of the course or courses he taught, the enrollment in each section that he taught, and the weekly contact hours for each section.

## FINDINGS

The purpose of this study was to determine the relationships between the current-unit-cost-per-student-contact-hour for arts and science transfer curricula and selected vocational-technical programs. The cost of each specialized vocational-technical curriculum was compared to the mean cost of education a student in the arts and science transfer curricula to see if there was a consistent relationship across the institutions included in the study. In addition, an analysis of each factor that contributed to the cost was done to ascertain any relationship that might exist.

The population for the study included all the area schools of Iowa which consisted of four area vocational schools and eleven area community colleges. Each area was visited personally by the investigator and data collected, through the assistance of the business manager, from the financial records of the institutions.

The study revealed in general that the current-unit-cost-per-student-contact-hour for vocational-technical curricula was greater than for arts and science transfer curricula. Of the factors related to this unit cost,

enrollment had the largest correlation of all factors.

## Average Cost Per Student

The data in Table 1 showed the average cost per student in arts and science transfer curricula and vocational-technical programs in the eleven area community colleges for the year studied. All arts and science transfer curricula were grouped together because these programs consisted of general courses which are common to almost all of these curricula. This commonality of courses among curricula results in unit costs which are similar for almost all arts and science transfer curricula in an institution. The vocational-technical curricula have a very low proportion of general courses which are common across all curricula and a high proportion of the more expensive specialized courses. This resulted in a greater variability in the unit costs for vocational-technical programs than was found among the arts and science transfer curricula. Thus, the average cost per student for arts and science transfer curricula was relatively stable basic cost for each institution to which the differential cost of vocational-technical programs could be compared.

In some areas more than one campus was in operation, thus the listing of curricula or programs for a campus within the area was alphabetical. For example, Area VI was served by two campuses, one at Iowa Falls and the other at Marshalltown. Thus, in alphabetica order, Iowa Falls was referred to as Campus 1 and Marshalltown as Campus 2. This system prevails throughout the remainder of the study. (See Appendix)

The data in Table 1 revealed the average annual cost of educating a student in arts and science transfer curricula in Area II as $1,018. All of the vocational-technical programs were more costly than arts and science. The most expensive program was auto mechanics, which cost $1,750 per student per year, followed by practical nursing at $1,657, refrigeration, heating and air-conditioning service at $1,588, farm equipment mechanics at $1,366, and electronics technology at $1,219.

Area III had an average annual cost of $1,000 for arts and science transfer curricula. Only three of the vocational-technical programs offered were used in this study, as many of the others were not started until late in the 1967-1968 fiscal year. Of the three programs considered, practical nursing was the most expensive with an annual average cost of $1,425 per student, followed by farm equipment mechanics at $1,339, and clerical office practice at $912.

Arts and science transfer curricula were offered at three different locations in Area V. The average-annual-cost-per-student in arts and science was $1,320 at Campus 1, $860 at Campus 2, and $1,198 at Campus 3. The cost of $1,320 at Campus 1 was the highest annual cost in this category across the state. The most costly vocational-technical program was medical assistant education with an average cost per student of $2,271 for the year. All of the other programs, except practical nursing at $2,042 were under $2,000, with clerical office on Campus 3 the lowest at $1,120.

Table 1. Average cost per student in arts and science transfer curricula and vocational-technical programs during 1967-1968 in eleven area community colleges in Iowa

| Curriculum | Area Community College (average cost per student in dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | II | III | V | VI | IX | X | XI | XIII | XIV | XV | XVI |
| Arts and science | | | | | | | | | | | |
| Campus 1 | 1,018 | 1,000 | 1,320 | 886 | 1,185 | 1,146 | 842 | 1,158 | 1,004 | 799 | 795 |
| Campus 2 | | | 860 | 782 | 1,093 | | | | | | 953 |
| Campus 3 | | | 1,198 | | | | | | | | |
| Auto body repair | | | | | 2,977 | 2,091 | | | 1,344 | 2,690 | 2,553 |
| Auto mechanics | | | | | | | | | | | |
| Campus 1 | 1,750 | | 1,438 | 1,997 | 2,413 | 2,334 | 2,357 | 2,848 | 1,214 | 1,078 | 3,051 |
| Campus 2 | | | | | | | | | | 2,583 | |
| Clerical office | | | | | | | | | | | |
| Campus 1 | | 912 | 1,387 | | 1,501 | 2,438 | 2,095 | 3,059 | 1,761 | 613 | 1,180 |
| Campus 2 | | | 1,395 | | | | | | | | |
| Campus 3 | | | 1,120 | | | | | | | | |
| Data processing | | | | | 1,781 | 2,299 | 1,993 | | | 2,834 | |
| Dental assistant | | | | 1,690 | | 2,742 | 1,623 | | | | |
| Electronics technology | | | | | | | | | | | |
| Campus 1 | 1,219 | | | 1,537 | 1,186 | 1,873 | | | | 1,926 | 1,683 |
| Campus 2 | | | | | 1,492 | | | | | 1,414 | |
| Farm equipment mechanics | 1,366 | 1,339 | | | | | | | | 3,272 | |
| Mechanical drafting | | | | | | 1,729 | | | | | |
| Mechanical technology | | | | | | | | | | | |
| Campus 1 | | | | | 1,641 | 2,070 | 4,031 | 2,296 | | | 2,851 |
| Campus 2 | | | | | | | | | | | 2,246 |
| Medical assistant education | | | 2,271 | | | 2,214 | 1,783 | 2,342 | | | 1,916 |

Table 1 (continued)

| Curriculum | Area Community College (average cost per student in dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | II | III | V | VI | IX | X | XI | XII | XIV | XV | XVI |
| Practical nursing | | | | | | | | | | | |
| Campus 1 | 1,657 | 1,425 | 2,042 | | 1,251 | 1,736 | | 1,763 | | 1,261 | 1,708 |
| Campus 2 | | | | | 1,370 | | | 2,088 | | | |
| Campus 3 | | | | | | | | 1,624 | | | |
| Radio-television service | | | | 1,027 | 1,916 | | | | 1,536 | | |
| Refrigeration, heating and air-donditioning | 1,588 | | | | 1,735 | | | | | | |
| Secretarial training | | | 1,254 | 1,834 | | 2,048 | 1,291 | | 1,680 | 1,614 | |
| Welding | | | 1,638 | | | 1,607 | 1,734 | | 2,059 | 932 | 4,261 |

The data for Area VI revealed annual average cost for arts and science of $782 and $886 on two separate campuses. Campus 2, at $782, provided the least expensive arts and science curricula across the state. Auto mechanics, at an annual average cost of $1,997, was the most expensive vocational-technical program offered in Area VI. Secretarial training for insurance business had a cost of $1,834, followed by dental assistant at $1,690. The least expensive program was radio-television service with an annual cost of $1,027 per student.

Area IX also provided two locations for arts and science transfer curricula. The average-annual-cost-per-student was $1,185 for Campus 1 and $1,093 for Campus 2. Two vocational-technical programs had per student costs above $2,000. They were auto body repair at $2,977 and auto mechanics at $2,413. Of the two electronics technology programs, the annual average cost for Campus 1 was $1,186, compared to Campus 2 with a cost of $1,492. Two programs of practical nursing were also provided, with Campus 1 having a cost of $1,251, as compared to $1,370 for the program at Campus 2.

The average annual cost for a student in arts and science transfer curricula in Area X was $1,146. Of the twelve vocational-technical programs considered in this study for Area X, nine had a cost of more than $2,000, with dental assistant being the greatest at $2,742. The three programs under $2,000 were electronics technology at $1,873, practical nursing at $1,736, and mechanical drafting at $1,729.

In area XI, the average cost per student in arts and science transfer curricula was $842. All of the vocational-technical programs were more costly than arts and science, with mechanical technology at $4,031 per student being the greatest. This program had the second highest annual cost per student of all vocational-technical programs offered in area community colleges across the state. The least expensive program was secretarial training with a cost of $1,291.

The arts and science transfer curricula in Area XI had an average annual cost of $1,158. This amount was less than the cost of each of the vocational-technical programs. Clerical office, with a per student cost of $3,059, was the most expensive program offered. It was also the most expensive of all clerical office programs provided throughout the state. Other programs that had the highest cost per student of any of its kind across the state was medical assistant education at $2,342 and practical nursing (Campus 2) at $2,088.

All vocational-technical programs offered in Area XIV had a higher average cost per student than for arts and science. Welding, at $2,059 was the most expensive, followed by clerical office at $1,761. The auto body repair program, at $1,344, was the least expensive program of its kind across all the areas.

Area XV had the third lowest cost per student in the arts and science

transfer curricula across the state at $799. All of the vocational-technical programs had costs greater than this except clerical office, which had an annual average cost of $613. This was the least expensive program provided in the state of all those considered in the study. The average annual cost for data processing was $2,834, but it should be noted that this program was oriented toward computer maintenance rather than programming. Of the two auto mechanics programs provided, the per student cost of $2,583 at Campus 2 was over two times greater than the $1,078 expenditure at Campus 1. The farm equipment mechanics program, with a cost of $3,272, was the most expensive vocational-technical program and exceeded the cost of like programs throughout the state.

In Area XVI, arts and science transfer curricula were offered in two locations. The average cost per student at Campus 1 was $795 compared to $953 at Campus 2. All of the vocational-technical programs had a greater cost than those of arts and science, with the cost of welding at $4,261 per student being the greatest. This program was also the most expensive of all programs considered in this study. Auto mechanics, with a cost of $3,051 per student, had the next highest cost in Area XVI. It was, however, the highest cost of any auto mechanics programs provided in the state.

The average costs per student that were recorded in Table 2 were compiled from data obtained from the four vocational schools in Iowa for 1967-1968. In Area I, the most expensive program was welding at an average annual cost of $4,118. This cost was the second greatest of any program offered across the state.

The second highest cost for a program in Area I was auto body repair at $2,989, which was also the greatest cost for any like program considered in the study. In contrast, the least expensive program was auto mechanics at $1,202, the third lowest cost for programs of auto mechanics across the state.

Of the four area vocational schools considered in this study, only Area IV had the costs of all programs below $2,000. Refrigeration, heating and air-conditioning service, with an average annual student cost of $1,685, was the greatest. Clerical office, at a cost of $1,150, was the least. With an average cost per student of $1,241, secretarial training was the least expensive program of its kind throughout the state.

In Area VII, only one of the ten programs offered had an average cost per student greater than $2,000. This program was auto mechanics at $2,016. The least expensive programs were electronics technology at a cost of $1,169 and mechanical technology at $1,151.

The greatest-average-annual-cost-per-student for a vocational-technical program in Area XII was $2,536 for dental assistant. The next highest were auto body repair at $1,814 and refrigeration, heating and air-conditioning service at $1,808. Auto mechanics, having an annual

Table 2. Average cost per student in selected vocational-technical programs in the four area vocational schools of Iowa for 1967-1968

| Program | Area I | Area IV | Area VII | Area XII |
|---|---|---|---|---|
| Auto body repair | $2,989 | $1,476 | $1,968 | $1,814 |
| Auto mechanics | $1,202 | $1,539 | $2,016 | $ 916 |
| Clerical office | $1,877 | $1,150 | $1,286 | $1,148 |
| Dental assistant | | | | $2,536 |
| Electronics technology | | | $1,169 | $1,691 |
| Farm equipment mechanics | $1,382 | | | |
| Mechanical drafting | | | $1,214 | $1,681 |
| Mechanical technology | | | $1,151 | |
| Practical nursing | $2,659 | | $1,704 | $1,533 |
| Radio-television service | | | $1,777 | $1,232 |
| Refrigeration, heating and air-conditioning | | $1,685 | | $1,808 |
| Secretarial training | $1,836 | $1,241 | | |
| Welding | $4,118 | $1,415 | $1,486 | $1,532 |

average cost for a student of $916, was the least expensive program in Area XII, as well as across the state.

## Inter-Area Comparison of Curricula Costs

The data reported in Table 3 showed the ratios of the average annual cost of educating a student in each of the vocational-technical programs to the average annual cost for a student in arts and science transfer curricula in the same area. These ratios were calculated by dividing the cost figure for each vocational-technical program by the cost for arts and science shown in Table 1. When an area contained more than one campus, the average cost for all campuses was used as the base cost for educating a student in the arts and science transfer curricula. This transfered the figure for arts and science into a standard ratio of 1.00 and related the cost of all other programs to it.

In this way it was possible to compare the cost of vocational-technical programs to the cost of arts and science in each area. For example, in Area II the auto mechanics program had a unit cost ratio of 1.72, which means that when comparing it to the cost of arts and science, the annual-average-cost-per-student for auto mechanics was 1.72 times greater. In terms of dollars, for every one dollar expended on a student in the arts and science transfer curricula, $1.72 was expended for a student in the auto mechanics program.

As noted in Table 3, only the clerical office programs in Areas III, V, and XV had a lower unit cost ratio than did arts and science curricula. Farm equipment mechanics in Area XV, mechanical technology in Area XI, and welding in Area XVI all had unit cost ratios above 4. They were 4.10, 4.79, and 4.88 respectively. This again implied that it took over 4 times as much expense to educate a student in these vocational-technical programs than it did in an arts and science transfer curricula.

It was difficult to make comparisons across areas because of the inconsistency in length of the various programs. Having been guided by local need rather than creating a uniform curriuclum across the state, the areas have the same program by name, but it may vary in length from nine months to two years. Also, each area has a different base cost for arts and science transfer curricula, thus unit cost ratios computed with different bases do not lend themselves to direct comparison across the areas.

This can be accomplished, however, by using the average annual cost for arts and science curricula for all areas across the state as a base unit cost. This weighted mean of $1,002 was divided into the average annual cost of each vocational-technical program by area and the results were listed in Table 4.

An examination of Table 4 showed that for auto body repair, three programs in the state were offered on a twelve month basis. Of these

Table 3. Ratio of vocational-technical program unit costs to the unit cost of arts and science transfer curricula during 1967-1968 in eleven area community colleges in Iowa

| Curriculum | Area Community College | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | II | III | V | VI | IX | X | XI | XIII | XIV | XV | XVI |
| Arts and Science | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Auto body repair | | | | | 2.61 | 1.82 | | | 1.34 | 3.37 | 2.92 |
| Auto mechanics | 1.72 | | 1.28 | 2.39 | 2.12 | 2.04 | 2.80 | 2.46 | 1.21 | 3.23 | 3.49 |
| Clerical office | | | | | | | | | | | |
| Campus 1 | | .91 | 1.23 | | 1.32 | 2.13 | 2.49 | 2.64 | 1.76 | .77 | 1.35 |
| Campus 2 | | | 1.24 | | | | | | | | |
| Campus 3 | | | .99 | | | | | | | | |
| Computer maintenance | | | | | | | | | | 3.55 | |
| Data processing | | | | | 1.56 | 2.01 | 2.37 | | | | |
| Dental assistant | | | | 2.03 | | 2.39 | 1.93 | | | | |
| Electronics technology | | | | | | | | | | | |
| Campus 1 | 1.20 | | | 1.84 | 1.04 | 1.63 | | | | 1.77 | 1.93 |
| Campus 2 | | | | | 1.31 | | | | | | |
| Farm equipment mechanics | 1.34 | 1.34 | | | | | | | | 4.10 | |
| Mechanical drafting | | | | | | 1.51 | | | | | |
| Mechanical technology | | | | | | | | | | | |
| Campus 1 | | | | | 1.44 | 1.81 | 4.79 | 1.98 | | | 3.26 |
| Campus 2 | | | | | | | | | | | 2.57 |
| Medical assistant education | | | 2.02 | | | 1.93 | 2.12 | 2.02 | | | 2.19 |
| Practical nursing | | | | | | | | | | | |
| Campus 1 | 1.63 | 1.43 | 1.81 | | 1.20 | 1.51 | | 1.52 | | 1.58 | 1.95 |
| Campus 2 | | | | | 1.10 | | | 1.80 | | | |
| Campus 3 | | | | | | | | 1.40 | | | |

Table 3 (continued)

| Curriculum | Area Community College | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | II | III | V | VI | IX | X | XI | XIII | XIV | XV | XVI |
| Radio-television service | | | | 1.23 | 1.68 | | | | 1.53 | | |
| Refrigeration, heating and air-conditioning | 1.56 | | | | 1.52 | | | | | | |
| Secretarial training | | | 1.11 | 2.20 | | 1.79 | 1.53 | | 1.68 | 2.02 | |
| Welding | | | 1.45 | | | 2.27 | 2.06 | | 2.06 | 1.17 | 4.88 |

Table 4. Ratio of vocational-technical program unit costs to the state-average cost of arts and science transfer curricula and length of programs in months during 1967-1968 in eleven area community colleges in Iowa

| Curriculum | Area Community II | | III | | V | | VI | | IX | |
|---|---|---|---|---|---|---|---|---|---|---|
| | R[a] | M[b] | R | M | R | M | R | M | R | M |
| Arts and science | | | | | | | | | (state-wide | |
| Auto body repair | | | | | | | | | 2.97 | 12 |
| Auto mechanics | | | | | | | | | | |
| Campus 1 | 1.75 | 24 | | | 1.44 | 24 | 2.55 | 11 | 2.41 | 12 |
| Campus 2 | | | | | | | | | | |
| Clerical office | | | | | | | | | | |
| Campus 1 | | | .91 | 12 | 1.38 | 6 | | | 1.50 | 6 |
| Campus 2 | | | | | 1.39 | 9 | | | | |
| Campus 3 | | | | | 1.12 | 9 | | | | |
| Data processing | | | | | | | | | 1.78 | 24 |
| Computer maintenance | | | | | | | | | | |
| Dental assistant | | | | | | | 2.11 | 11 | | |
| Electronics technology | | | | | | | | | | |
| Campus 1 | 1.21 | 24 | | | | | 1.67 | 12 | 1.18 | 24 |
| Campus 2 | | | | | | | | | 1.49 | 24 |
| Farm equipment mechanics | 1.36 | 24 | 1.34 | 24 | | | | | | |
| Mechanical drafting | | | | | | | | | | |
| Mechanical technology | | | | | | | | | | |
| Campus 1 | | | | | | | | | 1.64 | 24 |
| Campus 2 | | | | | | | | | | |
| Medical assistant education | | | | | 2.27 | 12 | | | | |
| Practical nursing | | | | | | | | | | |
| Campus 1 | 1.65 | 12 | 1.42 | 12 | 2.04 | 12 | | | 1.25 | 12 |
| Campus 2 | | | | | | | | | 1.37 | 12 |
| Campus 3 | | | | | | | | | | |
| Radio-television Service | | | | | | | 1.02 | 18 | 1.91 | 12 |
| Refrigeration, heating and air-conditioning | 1.59 | 24 | | | | | | | 1.73 | 12 |
| Secretarial training | | | | | 1.25 | 12 | 2.12 | 12 | | |
| Welding | | | | | 1.64 | 6 | | | | |

[a] R = ratio
[b] M = months

| College X | | XI | | XIII | | XIV | | XV | | XVI | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R | M | R | M | R | M | R | M | R | M | R | M |
| average cost of $1,002) | | | | | | | | | | | |
| 2.09 | 9 | | | | | 1.34 | 12 | 2.68 | 12 | 2.55 | 18 |
| 2.33 | 9 | 2.35 | 21 | 2.84 | 18 | 1.21 | 12 | 1.08 | 12 | 3.04 | 18 |
| | | | | | | | | 2.58 | 12 | | |
| 2.43 | 9 | 2.09 | 12 | 3.05 | 6 | 1.76 | 6 | .61 | 6 | 1.18 | 6 |
| 2.30 | 24 | 1.99 | 18 | | | | | | | | |
| | | | | | | | | 2.83 | 21 | | |
| 2.74 | 12 | 1.62 | 12 | | | | | | | | |
| 1.87 | 18 | | | | | | | 1.92 | 21 | | |
| | | | | | | | | 1.41 | 21 | | |
| | | | | | | | | 3.27 | 12 | | |
| 1.73 | 9 | | | | | | | | | | |
| 2.07 | 18 | 4.03 | 21 | 2.29 | 18 | | | | | 2.85 | 18 |
| | | | | | | | | | | 2.24 | 18 |
| 2.21 | 12 | 1.78 | 12 | 2.34 | 12 | | | | | 1.91 | 12 |
| 1.73 | 12 | | | 1.76 | 12 | | | 1.26 | 12 | 1.71 | 12 |
| | | | | 2.08 | 12 | | | | | | |
| | | | | 1.62 | 12 | | | | | | |
| | | | | | | 1.53 | 12 | | | | |
| 2.04 | 12 | 1.29 | 12 | | | 1.68 | 12 | 1.61 | 9 | | |
| 2.60 | 8 | 1.73 | 6 | | | 2.06 | 6 | .93 | 6 | 4.26 | 9 |

three, Area IX had the highest cost ratio at 2.97. To reiterate the significance of this figure, as well as all the unit ratios in Table 4, the average annual rate of educating a student in an auto body repair program in Area IX was 2.97 times greater than the average cost of educating a student for one year in arts and science transfer curricula in an area community college in Iowa.

The auto mechanics programs were of such varied length that it was almost impossible to draw any comparisons or show relationships. Of the four programs with a duration of twelve months, the two in operation at Area XV had the highest and lowest cost ratio, being 1.08 at Campus 1 and 2.58 at Campus 2.

Six of the eleven clerical office programs in the state were offered on a six month basis. The program in Area XIII, with a cost ratio of 3.05, was the highest and Area XV was the lowest at .61. All other programs, with a duration of nine or twelve months, had cost ratios between those above.

Inconsistency in length of programs was the dominent feature in data processing, dental assistant, farm equipment mechanics, mechanical drafting, radio-television service, and refrigeration, heating and air-conditioning service. There were no more than two programs in each category that operated for the same period of time. Three of the electronics technology programs operated for twenty-four months. The two in Area IX had the lowest and the highest cost ratio, these being 1.18 and 1.49, respectively. The highest cost ratio for all electronics technology programs across the state was 1.92 for a twenty-one month program on Campus 1 in Area XV.

The data in Table 4 also showed that the most consistency in length of program was for practical nursing. These programs, twelve months in length, are regulated by the State Board of Nursing and have a prescribed curriculum. Upon the completion of the program, a state exam must be successfully passed before a license may be received. The highest cost ratio of 2.08 was calculated for Campus 2 in Area XIII, while the lowest was 1.25 on Campus 1 in Area IX.

Five of the six secretarial training programs were offered for a twelve month period. Area VI with a cost ratio of 2.12 was the highest, while a 1.25 ratio for Area V was the lowest.

The highest cost ratio for any program in the state was 4.26 on a nine month welding program in Area XVI. The cost of educating a student in this program was 4.26 times greater than the average cost of arts and science in an area community college of the state.

## SUMMARY

An analysis of the current-student-cost-per-contact-hour throughout the state revealed a wide range of costs. In general, the programs for clerical office practice had a per student cost of less than one dollar per contact hour, while the cost for some welding and mechanical technology programs rose almost to four dollars per contact hour. The one determining factor that was evident in most of the higher costing programs was enrollment. It appeared that when programs had fewer than ten students the costs were substantially higher than similar programs across the state.

Another area of analysis was created by dividing the average-annual-cost-per-student for vocational-technical programs into two categories, direct chargeable expense and indirect prorated expense. The direct chargeable expense category included those expenses incurred directly by a program, such as salaries, instructional supplies, minor equipment, and that portion of rental expense charged to the program by the institution when more than one program shares the same rented facility. The indirect prorated expense category contained expenses incurred by administration salaries, operation and maintenance of the plant, and any other campus expenditure which provided benefit or service to any and all students, was then prorated to each vocational-technical program on the basis of full-time equivalent enrollment.

In some of the area schools, this indirect prorated expense exceeded forty percent of the program-per-student-cost. This factor alone was enough to make the average-annual-per-student-cost for some programs higher than the cost of similar programs in another area school.

The relationship between current-student-cost-per-contact-hour and related cost factors was measured by use of the Pearson-product-moment correlation. The respective figures for student cost and each of the related factors were tabulated for all one hundred seventeen programs. The highest correlation was found between cost and enrollment, while the second highest was between cost and indirect prorated expense.

The coefficient of correlation between enrollment and student cost was -.72. This indicated that as enrollment increased in a program the student cost decreased. It appeared that many programs, having as few as six to eight students, would have a smaller current-student-cost-per-contact hour if the enrollment would increase sufficiently. It should be noted, however, that in some vocational-technical courses there is a limit to the number of enrollees. In welding, for example, a shop may contain only a certain number of student stations, thus the feasible limit to the cost is controlled by program facilities, and not by enrollment.

The source and amount of funds received by an area determine in part the extent and type of program that was offered. The money raised by local taxes varied substantially throughout the areas, with the greatest amount being ten times more than the smallest amount received. The state

aid and tuition were tied closely to enrollment, thus they varied accordingly to the number of full-time equivalent enrollment in each area.

It would be hoped that in the future the ratios of enrollment to local tax money would become similar across the state in the area schools. If not, then an equalization plan should be developed to equip the areas financially so that the state's population can be served more equitably.

## CONCLUSIONS

Of the factors involved in program expense for an area school in Iowa, enrollment had the greatest degree of relationship with current-student-cost-per-contact-hour. Although this was an inverse relationship, it was significantly great enough to be a contributing factor.

The administrative expense and expense for operation of plant, which composed the majority of indirect prorated expense, were definite contributing factors to the current-student-cost-per-contact-hour for programs in many of the area schools. This was especially true in area community colleges where a large staff of administrators and supervisors were employed.

Instructional expense in the form of teacher's salaries and instructional supplies was a contributing factor, also. It appeared that when enrollments could be increased in various programs, it would not be necessary to proportionally increase salaries, thus the average student cost would be reduced.

The rental of buildings, which was necessitated in almost all areas by lack of facilities, was also a contributing factor to the current-student-cost-per-contact-hour. When new campuses or buildings are constructed so that programs can be housed in locally owned quarters, the expenses now being consumed by rent can be used more profitably for the programs.

In regards to the arts and science transfer programs being offered at sixteen campuses in Iowa, the factor of enrollment played an important role. It appeared that those institutions with enrollment under four hundred should give thought to attracting more students or to reorganize their program so that they can contribute more profitably to the area.

In genral, the vocational-technical programs were more expensive on an average-annual-student-cost basis than were the arts and science transfer curricula. The consummable items, such as instructional supplies and the major portion of minor equipment, causes higher costs for vocational-technical programs. There were exceptions in some programs, but the exception was usually due to a very large enrollment in the program, which in turn reduced the cost.

Because the junior colleges in Iowa have accepted the challenge to become comprehensive institutions and provide, not only arts and science curricula, but vocational-technical programs leading to employment, it is necessary that adequate financing be provided. The conclusions of this study should be instrumental in the provision of improved financial support to the tasks to be performed by individual institutions.

If it is important to a state that these curricula and programs be offered in adequate numbers, then the agency in charge of recommending policies for financing the area schools should consider some alternatives for gaining and distributing appropriate funds. Because of the differential cost of the various curricula in an institution, and when the state financial support is based on a flat amount per full-time equivalent student, it becomes necessary for the local district to supplement all of the burden of additional cost for the specialized curricula.

One possible solution is to weight the programs in the area school according to cost, as determined by the factors of enrollment, salaries, supplies, etc., and to reimburse accordingly. A state aid program based on this approach would allow area schools with equal wealth per student and equal local tax effort to finance vocational-technical programs for the same local cost per student as is required for the arts and science curricula.

# APPENDIX

## Directory of Area Schools and Community Colleges

| | |
|---|---|
| Area I | Northeast Iowa Area Vocational School<br>142 Main Street<br>Calmar, Iowa 52132 |
| Area II | North Iowa Area Community College<br>220 East State Street<br>Mason City, Iowa 50401 |
| Area III | Iowa Lakes Community College<br>201-1/2 South Sixth Street<br>Estherville, Iowa 51334 |
| Area IV | Northwest Iowa Area Vocational School<br>420 Ninth Street<br>Sheldon, Iowa 51201 |
| Area V | Iowa Central Community College<br>22 North 12th Street<br>Fort Dodge, Iowa 50501<br><br>Campus 1 - Eagle Grove<br>Campus 2 - Fort Dodge<br>Campus 3 - Webster City |
| Area VI | Community College<br>19 South Center<br>Marshalltown, Iowa 50178<br><br>Campus 1 - Iowa Falls<br>Campus 2 - Marshalltown |
| Area VII | Hawkeye Institute of Technology<br>2800 Falls Avenue<br>Waterloo, Iowa 50701 |
| Area IX | Eastern Iowa Community College<br>1829 State Street<br>Bettendorf, Iowa 52722<br><br>Campus 1 - Clinton<br>Campus 2 - Muscatine<br>Campus 3 - Scott |

| | |
|---|---|
| Area X | Community College<br>107 8th Avenue, S. E.<br>Cedar Rapids, Iowa 52404 |
| Area XI | Community College<br>315 Walnut<br>Ankeny, Iowa 50021 |
| Area XII | Western Iowa Tech<br>222 South Floyd Boulevard<br>Sioux City, Iowa 51101 |
| Area XIII | Iowa Western Community College<br>310 First National Bank Building<br>Council Bluffs, Iowa 51501<br><br>Campus 1 - Clarinda<br>Campus 2 - Council Bluffs<br>Campus 3 - Harlan |
| Area XIV | Southwestern Community College<br>P.O. Box 458<br>Creston, Iowa 50801 |
| Area XV | Iowa Technical Institute<br>Ottumwa Industrial Airport<br>Ottumwa, Iowa 52502<br><br>Campus 1 - Centerville<br>Campus 2 - Ottumwa |
| Area XVI | Southeastern Iowa Community College<br>201 Front Street<br>Burlington, Iowa 52601<br><br>Campus 1 - Burlington<br>Campus 2 - Keokuk |